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Characterization of x-ray streak cameras for use on Nova*

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Many of the diagnostics for Inertial Confinement Fusion target experiments on the Nova laser are built on carts that can be inserted into the target chamber in six-inch manipulator (SIM) tubes. A suite of SIM-based re-entrant x-ray streak cameras (SSCs) are used to record streaked spatial information in one dimension, such as the spectral output from a crystal spectrometer or a one-dimensional lineout from single or multiple pinhole images.

In order for experimenters to analyze the data from x-ray streak cameras, it is important that we have a quantitative understanding of the dynamic response and calibration of the streak cameras.

We have performed a number of calibrations of the SSCs both on the bench as well as with Nova disk target shots. By fielding the x-ray streak cameras on disk target shots where we use a time modulated laser intensity profile (self beating of the laser) on the target, we generate an x-ray comb. We are able to obtain much of the streak camera calibration information with a single Nova target shot. We have measured the streak camera sweep rates, curvature of the electron optics, resolution as a function of space and time in the sweep window, and effects due to magnetic fields in the Nova target chamber. In this paper we describe these measurements.

We will use the characterization measurements to make a direct comparison of a microchannel plate based x-ray streak camera vs. one with an image intensifier. We will also show results from experiments that rely on the details of the streak characterization to illustrate the importance of the calibrations.

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